Trend Study 2-1-01

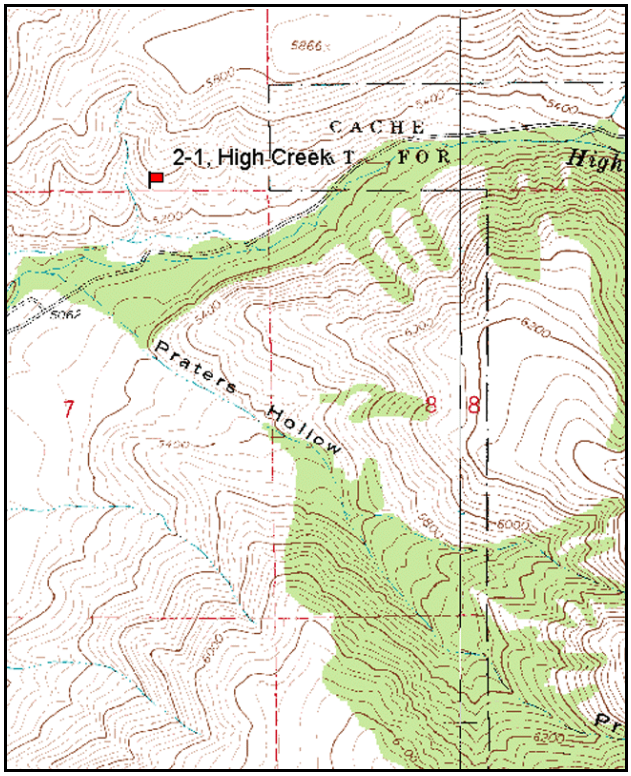
Study site name: High Creek . Vegetation type: Big Sagebrush .

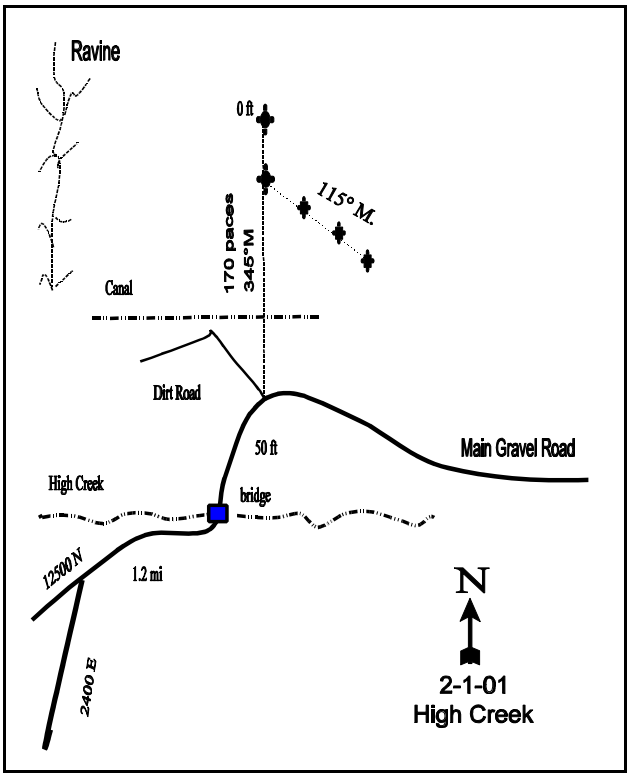
Compass bearing: frequency baseline 165 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (59ft), line 3 (34ft), line 4 (71ft). Rebar: belt 2 on 2 ft, belt 4 on 2ft, belt 5 on 2 ft.

LOCATION DESCRIPTION

From 12500 North and 2400 East in Richmond, proceed northeast for 1.2 miles and cross High Creek. Just beyond this crossing (north) a dirt road heads off to the northeast. From this intersection, walk 170 paces at a bearing of 345 degrees magnetic to the 100-foot stake of the frequency baseline. Walk 100 feet beyond this stake to the 0-foot stake, marked with browse-tag #7929. The baseline runs at 165 degrees magnetic. The baseline doglegs after 100 feet and runs in a direction of 115 degrees magnetic.





Map Name: Richmond

Diagrammatic Sketch

Township 14N , Range 2E , Section 6

UTM 4647239 N, 436682 E

DISCUSSION

Trend Study No. 2-1

The High Creek study, located on the north side of High Creek, samples critical winter range on the northernmost part of the herd unit near the Idaho border. Unlike most of the Cache County "face" where sagebrush and other shrubs have been largely eliminated, this area retains a moderately dense mountain big sagebrush population. The site is on a fairly steep (35% to 40%), south-facing slope at 5,380 feet in elevation. The site lies about 700 ft above High Creek. The hillside on which the study is located contains many open areas dominated by annual and perennial weeds. Deer and elk pellet groups were infrequent in the past, entirely absent in 1996, and in low numbers in 2001. A pellet group transect read along the study site baseline in 2001 estimated 10 deer and 2 cow days use/acre (25 ddu/ha, 5 cdu/ha). Utilization appears to be from the fall and winter.

Soil is moderately shallow with a clay loam texture. Parent material is limestone. Rocks are common on the surface (>20%) and in the profile. They consist of both large limestone cobble and smaller gravel sized rock. Water infiltration rates should be rapid. Effective rooting depth (see methods) was estimated at nearly 10 inches in 1996, but the high amount of rock in the profile restricted accurate penetrometer readings. Rooting depth is obviously not overly restrictive since the site contains a moderately dense stand of mountain big sagebrush. The high amount of rock on the surface and upper soil profile does contribute to moderately high soil surface temperatures however. Soil temperature was estimated at nearly 70° F at a depth of about 10 inches. Protective ground cover is abundant, but comes largely from weedy plant cover and litter. The erosion condition class was determined to be stable in 2001, and no active erosion is evident at this time.

Browse composition consists of a fairly dense stand of mountain big sagebrush with a few remnant antelope bitterbrush. The mountain big sagebrush population tends to be clumped or aggregated on this site. Because of this and the relatively small sample size, density was overestimated to some extent at 4,132 plants/acre in 1984. Utilization was extremely heavy that year when 76% of the population displayed heavy use. Density remained somewhat similar in 1990 with an estimated 3,666 plants/acre. A larger proportion of the population (35% vs 19%) were classified as young. This may have been a classification problem between readers. Utilization in 1990 was light, percent decadency increased to 13%, and 41% of the mature and decadent shrubs displayed poor vigor. In 1996, density declined slightly due to a reduction in the amount of young plants in the population. Some of the change is due to the much larger, more representative sample used in 1996 which tripled the original sample size. Utilization was light to moderate, percent decadency was moderately low at 18%, and vigor good on all but a few mature and decadent plants. Seed production appeared good in 1996. Some of the decadent shrubs appear to have partial crown death due to some kind of winter injury or some other natural event (prolonged drought), not heavy browsing. Density declined slightly in 2001, but use was mostly light and vigor normal. Leader growth averaged only 1.5 inches in 2001. Percent decadence increased slightly to 22%, but this is still relatively low. Recruitment is currently (‘01) poor with low numbers of seedlings and young encountered.

Antelope bitterbrush occurs as scattered mature plants. Apart from vegetative reproduction (i.e., layering), relatively few seedling or young bitterbrush can be found, and none occurred within the shrub density strips during any reading. Although bitterbrush was not encountered on the density plots in 1984 or 1990, it was picked up in the much larger sample of 1996 and 2001. Density was estimated at only 140 mature plants/acre in 2001. Utilization was reported to be heavy in 1984 and 1990, but more moderate in 1996. Use was again heavy in 2001, which is not surprising considering bitterbrush’s small numbers. Vigor was normal. However, leader growth was estimated at only just over 1 inch in 2001.

The herbaceous understory is abundant, yet dominated by annual grasses and weedy forbs. Annual grasses made up 89% of the grass cover in 1996 and 81% in 2001. Only three perennial grasses, bluebunch wheatgrass, Sandberg bluegrass, and bulbous bluegrass were encountered on the site. The more preferred Sandberg bluegrass and bluebunch wheatgrass combined to produce only 9% of the grass cover in 1996 and 5% in 2001. Cheatgrass brome is the most abundant species on the site.

The forb composition is diverse and abundant, but dominated by weedy species that typically act as invaders or increasers on disturbed sites. Dominant species include ragweed, willowweed, storksbill, and yellow salsify. Most of the remaining species (see data summary) are generally low value increaser forbs.

1984 APPARENT TREND ASSESSMENT

Soil trend appears stable to declining at a low condition level. Erosion is apparent but not of large magnitude. Vegetative cover, especially from perennial herbaceous plants, is rather poor. Vegetative trend indicators suggest a thickening stand of mountain big sagebrush and a stable or declining bitterbrush population. It also indicates a herbaceous composition dominated by biennial and perennial weeds and other poor value species. No evidence suggests an improving perennial grass or forb composition.

1990 TREND ASSESSMENT

Although assessed as increasing in 1984, the population of big sagebrush declined by 11% in 1990. However, the proportion of young plants in the population increased from 19% in 1984 to 35%. Sagebrush canopy cover averages 17%. Percent decadency increased to 13%, although utilization was light. Vigor is poor on 44% of the mature and 36% of the decadent sagebrush. The remnant bitterbrush occurs in small numbers which has been heavily utilized. This shrub is considered a very minor component of the community. Trend for browse is considered stable. The only perennial grass has increased in nested and quadrat frequency. However, it is still a minor component within the weedy understory. There are many forbs, but only 9 out of the 20 had increased nested and quadrat frequency values with 6 out the 9 classified as weedy increasers. The understory remains dominated by undesirable weedy and annual species.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - down slightly and still in poor condition (2)

1996 TREND ASSESSMENT

Protective ground cover is abundant on this site leaving little bare ground unprotected. Trend for soil is up due to an increase in litter cover from 21% to 57% and a decline in percent bare ground from 12% to <1%. The browse trend appears stable. Density remains similar to 1990 estimates with the exception of a decline in the number of young plants. Utilization is mostly light with vigor improved from 1990 observations. Percent decadency increased slightly (13% to 18%). One cause for concern on this site is the apparent lack of seedlings and young combined with the abundant herbaceous understory which is dominated by annual grasses and weedy forbs. These winter annuals and weeds provide considerable competition to the establishment of sagebrush seedlings. These weedy species also provide a high amount of fine fuels which increases the hazard of wild fire which would eliminate sagebrush from the site. The herbaceous understory trend is down. The site is still dominated by annuals and weedy forbs. Bluebunch wheatgrass and Sandberg bluegrass increased in nested frequency since 1990, but sum of nested frequency for forbs declined with 10 of the 15 species sampled in 1990 declining significantly.

TREND ASSESSMENT
soil - up (5)
browse - stable (3)
herbaceous understory - down with poor composition (1)

2001 TREND ASSESSMENT

Trend for soil is stable due to abundant herbaceous vegetation and litter cover. There is no sign of accelerated erosion. Trend for the key browse species, mountain big sagebrush is slightly down. The population density has declined by 29%. Utilization is mostly light, vigor good, and percent decadence moderately low at 22%. Recruitment in the form of seedlings and young is still poor due to the herbaceous understory that is dominated by cheatgrass and weedy biennial forbs. Decadent sagebrush classified as dying are currently more numerous than the young plants that are needed to replace them. This was also the case in 1996, and it appears that the population is in a state of decline due to lack of young recruitment. Trend for the herbaceous understory is stable but still in poor condition. Sum of nested frequency for perennial grasses increased due to a significant increase in bulbous bluegrass, a low value species. Cheatgrass still dominates the site by providing 71% of the grass cover and 54% of the total herbaceous cover. The forb composition continues to be poor, dominated by weedy annual and biennial species.

TREND ASSESSMENT
soil - stable (3)
browse - down slightly (2)
herbaceous understory - stable but still dominated by annuals (3)

HERBACEOUS TRENDS --
Herd unit 02 , Study no: 1

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron spicatum	a9	ab25	b31	b34	5	12	16	18	2.02	1.15
G	Bromus brizaeformis (a)	-	-	b85	a38	-	-	31	18	.77	.12
G	Bromus japonicus (a)	-	-	b158	a68	-	-	56	29	4.85	.72
G	Bromus tectorum (a)	-	-	306	371	-	-	79	98	23.27	24.90
G	Poa bulbosa	a-	ab3	b26	c88	-	1	11	31	.83	4.37
G	Poa secunda	a-	a-	b13	b16	-	-	5	8	.84	.43
Total for Annual Grasses		0	0	549	477	0	0	166	145	28.90	25.74
Total for Perennial Grasses		9	28	70	138	5	13	32	57	3.69	5.96
Total for Grasses		9	28	619	615	5	13	198	202	32.60	31.70
F	Agoseris glauca	b17	b16	a-	a-	10	7	-	-	-	-
F	Allium acuminatum	6	-	-	-	2	-	-	-	-	-
F	Alyssum alyssoides (a)	-	-	a95	b194	-	-	40	71	.22	1.63
F	Ambrosia psilostachya	b284	a15	a16	a35	92	9	6	16	.69	.64
F	Artemisia ludoviciana	7	6	4	14	2	2	1	6	.15	.74
F	Astragalus spp.	-	4	-	-	-	2	-	-	-	-

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Balsamorhiza sagittata	-	-	-	-	-	-	-	-	-	.15
F	Calochortus nuttallii	$_{b}$24	$_{a}$-	$_{a}$-	$_{b}$30	12	-	-	13	-	.19
F	Cirsium undulatum	-	4	-	-	-	1	-	-	-	-
F	Collinsia parviflora (a)	-	-	-	1	-	-	-	1	-	.00
F	Crepis acuminata	$_{a}$-	$_{ab}$5	$_{b}$7	$_{ab}$3	-	2	5	2	.27	.04
F	Cymopterus spp.	-	-	-	6	-	-	-	2	-	.03
F	Epilobium brachycarpum (a)	$_{a}$-	$_{c}$127	$_{c}$119	$_{b}$63	-	54	50	31	1.78	.25
F	Erodium cicutarium (a)	-	-	$_{a}$30	$_{b}$193	-	-	12	63	.35	6.77
F	Galium aparine (a)	-	-	6	7	-	-	3	3	.18	.04
F	Grindelia squarrosa	$_{a}$-	$_{a}$-	$_{a}$5	$_{b}$17	-	-	3	8	.21	.87
F	Hackelia patens	$_{a}$2	$_{b}$12	$_{a}$1	$_{a}$-	1	5	1	-	.03	-
F	Helianthus annuus (a)	$_{a}$-	$_{b}$30	$_{a}$-	$_{a}$6	-	17	-	3	.00	.06
F	Lappula occidentalis (a)	-	-	10	-	-	-	4	-	.02	-
F	Lactuca serriola	$_{a}$-	$_{b}$47	$_{b}$28	$_{a}$4	-	23	13	2	.72	.02
F	Lomatium grayi	$_{bc}$27	$_{c}$30	$_{ab}$4	$_{a}$-	10	12	3	-	.04	-
F	Lupinus argenteus	$_{a}$2	$_{a}$-	$_{a}$-	$_{b}$12	1	-	-	6	-	.43
F	Machaeranthera spp	$_{b}$92	$_{a}$-	$_{a}$-	$_{a}$-	47	-	-	-	-	-
F	Microsteris gracilis (a)	-	-	-	4	-	-	-	2	-	.01
F	Oenothera caespitosa	$_{b}$15	$_{b}$16	$_{a}$-	$_{a}$-	8	8	-	-	.00	-
F	Phacelia hastata	$_{a}$7	$_{b}$24	$_{a}$-	$_{a}$-	3	11	-	-	-	-
F	Phlox longifolia	3	-	-	9	1	-	-	3	-	.01
F	Polygonum douglasii (a)	-	-	8	20	-	-	4	7	.02	.06
F	Ranunculus testiculatus (a)	-	-	-	5	-	-	-	2	-	.01
F	Tragopogon dubius	$_{a}$16	$_{b}$58	$_{ab}$37	$_{a}$31	7	29	18	13	.76	.41
F	Veronica biloba (a)	-	-	$_{a}$12	$_{b}$169	-	-	4	63	.04	1.68
F	Zigadenus paniculatus	$_{a}$1	$_{a}$-	$_{a}$1	$_{b}$20	1	-	1	12	.03	.26
Total for Annual Forbs		0	157	280	662	0	71	117	246	2.64	10.53
Total for Perennial Forbs		503	237	103	181	197	111	51	83	2.92	3.82
Total for Forbs		503	394	383	843	197	182	168	329	5.56	14.36

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 02 , Study no: 1

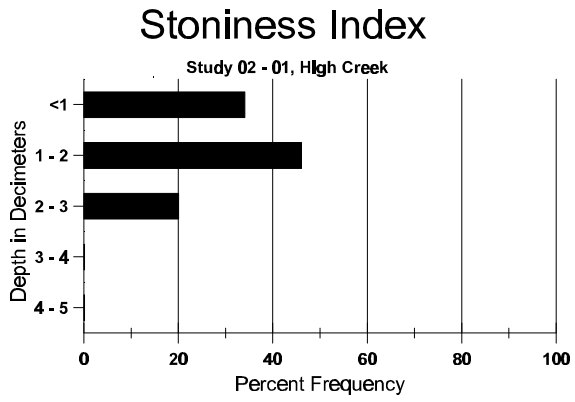
Type	Species	Strip Frequency '96	Strip Frequency '01	Average Cover % '96	Average Cover % '01
B	Artemisia tridentata vaseyana	62	54	12.29	13.07
B	Purshia tridentata	8	6	1.85	1.24
Total for Browse		70	60	14.14	14.32

BASIC COVER --
Herd unit 02 , Study no: 1

Cover Type	Nested Frequency '96	Nested Frequency '01	Average Cover % '84	'90	'96	'01
Vegetation	387	390	2.25	6.50	56.92	57.89
Rock	237	242	37.00	49.25	19.50	19.99
Pavement	124	154	21.00	11.50	6.28	3.97
Litter	393	365	30.25	21.00	56.94	34.85
Cryptogams	9	7	1.50	0	.07	.04
Bare Ground	53	88	8.00	11.75	.72	3.32

SOIL ANALYSIS DATA --
Herd Unit 02, Study no: 01, High Creek

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
9.7	69.6 (10.5)	7.2	42.9	29.1	28.0	2.2	16.3	150.4	.5



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 1

Type	Quadrat Frequency		Pellet Transect	
			Pellet Groups per Acre	Days Use per Acre (ha)
	'96	'01	⁄01	⁄01
Deer	-	2	131	10 (25)
Cattle	-	2	26	2 (5)

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 1

AGE	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Artemisia tridentata vaseyana																		
S	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	84	-	10	14	-	-	-	-	-	-	21	2	1	-	800			24
	90	36	2	-	1	-	-	-	-	-	39	-	-	-	1300			39
	96	1	1	-	-	-	-	-	-	-	2	-	-	-	40			2
	01	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
M	84	2	17	76	-	-	-	-	-	-	94	1	-	-	3166	25	30	95
	90	56	1	-	-	-	-	-	-	-	32	1	24	-	1900	24	36	57
	96	73	22	-	1	-	-	-	-	-	95	-	1	-	1920	26	38	96
	01	50	11	4	-	-	-	-	-	-	65	-	-	-	1300	29	44	65
D	84	-	1	4	-	-	-	-	-	-	4	-	1	-	166			5
	90	13	1	-	-	-	-	-	-	-	9	-	2	3	466			14
	96	15	2	5	-	-	-	-	-	-	12	-	3	7	440			22
	01	18	1	-	-	-	-	-	-	-	15	-	-	4	380			19
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	860			43
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	620			31

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	23%	76%	02%	-11%
'90	04%	00%	26%	-35%
'96	21%	04%	09%	-29%
'01	15%	05%	05%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	4132	Dec:		4%
'90	3666			13%
'96	2400			18%
'01	1700			22%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	11	19	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	0	Dec:		-
'90	0			-
'96	0			-
'01	0			-

Purshia tridentata																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	3	8	-	-	-	-	-	-	-	11	-	-	-	220	31	72	11
	01	-	2	5	-	-	-	-	-	-	7	-	-	-	140	26	66	7
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	120			6
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	73%	00%	00%	-36%
'01	29%	71%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'84	0	Dec:	-
'90	0		-
'96	220		-
'01	140		-